

LEE -- 10/725,381

Attorney Docket: 040008-0306859

IN THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently amended) A method for forming a barrier metal of a semiconductor device, comprising:

forming an insulating layer on a semiconductor substrate and forming an opening in the insulating layer;

forming a TiSiN layer having a desired thickness by repeatedly performing a process of forming a TiSiN layer having an atomic layer thickness in a reaction chamber, which performs wherein the process of forming a TiSiN layer having an atomic layer thickness comprises performing deposition of a Si layer inside the opening and on the insulating layer using an atomic layer deposition process, discharging a gas remaining in the reaction chamber by using an inert gas, and performs performing deposition of a certain precursor layer on the Si layer, and discharging a gas of precursor material remaining in the reaction chamber by using an inert gas; and

performing plasma processing for the TiSiN layer so as to remove impurities contained in the TiSiN layer.

2.-3. (Canceled)

4. (Previously presented) The method of claim 1, wherein the Si layer is deposited using an SiH₄ gas.

5. (Original) The method of claim 1, wherein the precursor layer is formed by any one of a Tetrakis DiMethyl Amido Titanium (TDMAT) layer, a Tetrakis DiEthyl Amido Titanium (TDEAT) layer and a TiCl₄ layer.

6.-7. (Canceled)

8. (Original) The method of claim 4, wherein the precursor layer is formed by any one of a Tetrakis DiMethyl Amido Titanium (TDMAT) layer, a Tetrakis DiEthyl Amido Titanium (TDEAT) layer and a TiCl₄ layer.

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9. (Original) The method of claim 5, wherein the TiSiN layer having the atomic layer thickness is formed by reacting the precursor layer by thermal decomposition at a temperature ranging from 350 to 450°C.
- 10.-11. (Canceled)
12. (Original) The method of claim 8, wherein the TiSiN layer having the atomic layer thickness is formed by reacting the precursor layer by thermal decomposition at a temperature ranging from 350 to 450°C.
13. (Original) The method of claim 1, wherein the TiSiN layer is plasma processed so as to remove CH based impurities contained in the TiSiN layer.
14. (Original) The method of claim 13, wherein the TiSiN layer is plasma processed under any one atmosphere of a nitrogen gas and a hydrogen gas, or an ammonia gas.
15. (Original) The method of claim 1, wherein the opening is formed into any one of a contact hole and a via hole.
16. (New) The method of claim 1, wherein the inert gas is a nitrogen gas or argon gas.
17. (New) The method of claim 1, wherein a pressure of the reaction chamber is between 90 and 300 Torr.